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# Saturn's Atmosphere at 5.2 Microns

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Unexpected variations of Saturn's radiance have been found at 5.2 microns emission in an atmospheric window containing only weak gaseous absorption. These variations contain a strong axisymmetric component as well as large discrete features at low latitudes and near 45 degrees S latitude that are several degrees colder than the planetary average. The lack of any morphological correlation between the 5.2 microns features and features at shorter wavelengths that are dominated by reflected sunlight, together with preliminary radiative transfer calculations, argues that the observed changes result from variations of the properties of a cloud at or below the 1-bar level. While the low-latitude region equatorward of approximately 15 degrees latitude is a location common to dynamic activity for clouds detected in both reflected sunlight and in thermal emission, it is likely that we are not simply seeing two expressions of the same physical changes, but different effects at two atmospheric levels. This is underscored by the fact that large cold spots frequently detected at 45 degrees S latitude are not associated with any changes of cloud reflectivity at shorter wavelengths.

These results have several implications. Foremost, this spectral region is likely to be an extremely useful tool for understanding cloud structure and dynamics in Saturn, an atmosphere whose visible cloud features and their variability is subtle, at best. This tool is likely to be one of the few means to determine variability and associated dynamics of clouds at or deeper than the 1-bar level in the planet. Because this spectral range is within the grasp of the Cassini orbiter Visible/Near Infrared Mapping Spectrometer (VIMS), VIMS will be able to explore the association of 5 microns radiation with clouds at several levels that it will detect at shorter wavelengths or that the Composite InfraRed Spectrometer (CIRS) experiment will detect at longer wavelengths.

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